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(54) LIGHT-WEIGHT COATED PAPER FOR PRINTING AND ITS PRODUCTION

(57) Abstract:

PURPOSE: To obtain a light-weight coated paper for printing having excellent development of luster free from disorder such as printing unevenness and setting off in high operation efficiency.

CONSTITUTION: This light-weight coating paper for printing has 20-30g/m2 absolute-dry weight of a base, comprises a coating layer formed by coating one side or both sides of the base with a coating solution having • 40wt. % solid content concentration by using a curtain coater and has a coated amount per one side of the coated layer of 6-14g/m2 bone-dry weight.

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CLAIMS

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[Claim(s)]

20-30 [Claim 1] Coated paper for lightweight printing characterized by a base material consisting of basis weights 20-30g/m<sup>2</sup>, and coming to prepare per [ 6-14g ] one side/the application layer of m<sup>2</sup> (bone-dry coverage) in one side or both sides of this base material in the coated paper for lightweight printing.

[Claim 2] The manufacture technique of the coated paper for lightweight printing characterized by applying to one side or both sides of a base material which consist of basis weights 20-30g/m<sup>2</sup> two times by the curtain coater the 6-14g [ /m ] bone-dry coverage per one side, and preparing an application layer in them in the manufacture technique of the coated paper for lightweight printing using application liquid of 40 % of the weight or more of the solid-content concentration which makes a pigment and adhesives a principal component.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention makes a mail order catalog, a throwaway, etc. a typical application about the coated paper for lightweight printing, and its manufacture technique, and it is related with the desirable coated paper for lightweight printing, and its manufacture technique that it is compatible in a printability and \*\*\*\*\*.

[0002]

[Description of the Prior Art] Conventionally, coated paper is excellent in smooth nature as compared with the paper of fine quality of a non-coating, and since the absorptivity of ink is uniform, it is widely used as a print sheet. Especially visualization of recent years and printed matter progresses, the proportion of color printing to which multicolor printing is given increases, and the proportion of the coated paper occupied to a print sheet is increasing steadily.

[0003] However, when the application liquid which makes a pigment and adhesives a principal component is applied on a base material, a basis weight increases with a natural thing. Such an increase will cause transportation or a mailing increase in cost, especially, in the intended-use field of the mail order catalog with the high proportion of a mailing cost, and a goods throwaway, it is hard to welcome such an increase and the fine coated paper of \*\*\*\*\* was welcomed as a print sheet by the low basis weight.

[0004] If the fine coated paper of \*\*\*\*\* is applied with the application method which said the coated paper which the coverage per [ which whose coverage of the bone dry per one side is the coated paper of the domain of 3-6g/m<sup>2</sup> in general, and requires it ] one side is not filled with a bone dry into 6g/m<sup>2</sup> as the blade, the rod, the air knife, and the transfer roll and which is used conventionally, an application layer cannot cover a base material completely, but some problems will produce it.

[0005] That is, when the coverage of a base material is low, in the fraction which is not covered and the fraction covered, the amounts of impression of ink differ at the time of printing, and it becomes easy to generate printing nonuniformity at it. It is easy to generate such printing nonuniformity by color printing of the multiple color which has become in use especially in recent years. Moreover, since the ink transferred to the fraction which is not covered permeates a base material directly, it tends to generate failure, such as back projection, and also tends to generate such failure in multicolor color printing with many amounts of transition of ink.

[0006] Like, it cannot say that it is the quality which can not necessarily be satisfied in the quality represented by such printability in multicolor color printing if it is a transportation cost and the low basis weight which was excellent in respect of the amount of information per weight especially in the mailing cost and the fine coated paper of \*\*\*\*\* is applied by the conventional application method, but is in the present condition that the reduction in a basis weight and coexistence of a printability cannot be aimed at.

[0007] If the problem in the printability of a fine coated paper originates in the lowness of the

coverage of an application layer, it reduces the basis weight of a base material and the technique of allotting a part for such loss in quantity to an increased part of a coverage also has it. That is, since they can, the more, make high the rate of the coverage of an application layer to the basis weight of coated paper the more there are few basis weights of a base material, they can obtain a high printability.

[0008] However, it is indispensable to raise opacity, in order to avoid an interference of the front reverse of a printing side, when the basis weight of a base material performs a double spread to such a base material and produces the coated paper for lightweight printing using the parvus, i.e., a thin base material. As a means which raises opacity, although it is common to take a means to increase the rate of addition of a loading material, if the addition proportion of a loading material is raised, the intensity of a base material will fall and occurrence of a detailed hole, i.e., a pinhole, will not be escaped.

[0009] A fall of the intensity of a base material produces a problem in the conventional application method called the blade, the rod, the air knife, and transfer roll at the time of an application. That is, in the post-measurement type application method of a blade, a rod, an air knife, etc., since there is distance from liquid supply of the application liquid to a base material to measurement, after performing penetration of the application liquid to a base material enough, it is exposed to the shear field in a metering zone. That is, since it is exposed to a shear field when the base material with a weak intensity swells with the water in application liquid and an intensity falls further, the probability of a disconnection of a base material becomes very high, and the problem referred to as being unable to apply as a matter of fact is produced.

[0010] The problem referred to as the probability of a disconnection of a base material by the tacking which is the outlet of the roll with which the roll after an application and a base material will exfoliate if the intensity of a base material is low, although an on-the-strength fall of the base material based on [ are a front measurement / which imprints the liquid which it \*\*\*\*ed beforehand with the transfer roll / type application method, and ] the distance difference of the liquid supply section and a metering zone does not happen, and considers application liquid as mediation being unable to become very high [0011] applying to the base material with few basis weights according to such a fact -- being alike -- it can be judged that the impossible present condition is using the application method generally used conventionally as a matter of fact

[0012]

[Problem(s) to be Solved by the Invention] the coverage it may be satisfied of a coverage with the base material of a low basis weight with possible the purpose of this invention aiming at coexistence of the amount of information per unit weight, and a high printability in a printability -- the covering nature to a base material -- it is offering the coated paper for lightweight printing applied in the high status, and is obtaining under the stable operating condition, without the failure used as remarkable defects, such as a disconnection of a base material, generating the coated paper for lightweight printing to apply

[0013]

[Means for Solving the Problem] A base material consists of basis weights 20-30g/m<sup>2</sup>, and the coated paper for lightweight printing of this invention is characterized by coming to prepare per [ 6-14g ] one side/the application layer of m<sup>2</sup> (bone-dry coverage) in one side or both sides of this base material, it is a low basis weight and has the characteristic feature which is excellent in a printability.

[0014] Moreover, the manufacture technique of the coated paper for lightweight printing of this invention Application liquid of 40 % of the weight or more of the solid-content concentration which makes a pigment and adhesives a principal component is used for one side or both sides of a base material which consist of basis weights 20-30g/m<sup>2</sup>. It is in the operation status which is characterized by applying two times by the curtain coater the 6-14g [/m ] bone-dry coverage per one side, and preparing an application layer, does not have failure, such as a disconnection of a base material, in the case of the application operation to a low basis-weight base material, and was stabilized. by the low basis weight It has the characteristic feature from which the coated paper for lightweight printing

excellent in the printability is obtained.

[0015] Since they can, the more, make high the rate of the coverage of an application layer to the basis weight of coated paper the more there are few basis weights of a base material, they can obtain a high printability. However, when the homogeneity of the mass distribution which is a property important as a base material of manufacturing a base material by the stable operating condition or coated paper is taken into consideration, the minimum desirable base-material basis weights are 20g/m<sup>2</sup> in a bone dry. Of course, it is desirable to set the basis weight of a bone dry to 30g/m<sup>2</sup> with the paper-making equipment which usually mills the base material of the coated paper for printing about the upper limit of a base-material basis weight, if a mailing cost etc. is further taken into consideration in consideration of making high the amount of information per [ which is the purpose of original of the coated paper for lightweight printing in this invention ] unit weight, although it is possible to two or more [ 100g //m ] at the basis weight of a bone dry. That is, if both significance of existence of original of a printability and a lightweight print sheet is taken into consideration, as for the basis-weight domain of a base material, it is desirable that it is 20-30g/m<sup>2</sup> in a bone dry.

[0016] in order to secure a print sheet and required opacity weakly in respect of an intensity by the low basis weight like such a base material -- the proportion for a loading material -- high -- not carrying out -- it does not obtain but a base material becomes weak in respect of an intensity increasingly Moreover, by the increase in a loading material, since the occurrence frequency of a pinhole increases, an intensity becomes weak further partially.

[0017] On the other hand, according to the ground for explaining below, a curtain application method has few basis weights which start, and suits an application of the base material with a weak intensity. That is, since an on-the-strength fall of the base material which originates in penetration of the water in application liquid since a curtain coater is a pre-measurement type coater and measurement has ended it before transition of the application liquid to a base material does not happen and the pressure from the exterior is not applied to a base material at the time of transition of application liquid, either, a disconnection of a base material does not happen. Moreover, since it applies, when a pinhole is in a base material by transition of the liquid membrane on a curtain, there is no failure and it is possible for application liquid to cover a pinhole.

[0018] Furthermore, since the pressure in connection with penetration of liquid is only a vas-capillare pressure and it can suppress penetration of application liquid to the minimum extent at the time of an application, also at the xeransis process after an application, an on-the-strength fall of a base material does not happen, but the probability of a disconnection of a base material can be made low.

[0019] The application layer applied by the curtain coater is extended by the base material the curtain layer which has uniform thickness in the cross direction runs continuously, and it becomes an application layer. Therefore, in order to form the application layer of uniform thickness regardless of the irregularity of a base material, comparatively, a low coverage also has the high covering nature of a base material, and has a high printability.

[0020] According to the place where this invention persons repeated the study further, the domains of the desirable domain of a coverage are per one side, 6-14g/m<sup>2</sup> in the coverage of a bone dry as coated paper for lightweight printing in this invention. If [ than 14g/m<sup>2</sup> ] more, if fewer than 6g/m<sup>2</sup>, the base material by the application layer cannot be covered completely, a high printability cannot be obtained, but stiffness is too low, especially, in sheet printing, the conveyance nature of the coated paper for lightweight printing will get worse, and failure will generate it as a printer.

[0021] Moreover, the solid-content concentration of application liquid affects the permeability to the base material of application liquid. When using and applying a curtain coater to the base material with few basis weights as in the coated paper for lightweight printing of this invention, when solid-content concentration is 40 % of the weight or more, also at the xeransis process after an application, an on-the-strength fall of a base material does not happen, but the probability of a disconnection of a base material can be made low.

[0022] The curtain coater in this invention points out the equipment which transfers a curtain layer to

the base material which forms and runs the curtain layer with uniform layer thickness continuously in the cross direction from an application head as an application layer.

[0023] In this invention, the application liquid which makes a pigment and adhesives a principal component is the liquid water was made to melt or distribute with a pigment, adhesives, in addition an additive. Generally the adhesives of the blending ratio of coal of a pigment and adhesives are 10 - 70 weight section preferably more than 5 weight section to the pigment 100 weight section.

[0024] As a pigment used by this invention, a kaolin, clay, a calcium carbonate, a satin white, titanium oxide, an aluminum hydroxide, a zinc oxide, a barium sulfate, a calcium sulfate, a silica, the activated clay, a lake, a plastics pigment, a binder pigment, etc. are mentioned.

[0025] As adhesives used for this invention, a styrene butadiene system, vinegar \*\* and acrylic, Various copolymers, such as ethylene and a vinegar \*\* system, a butadiene methyl methacrylic system, and a vinegar \*\* butyl acrylate system, Polyvinyl alcohol, a maleic-anhydride copolymer, an isobutene and a maleic-anhydride copolymer, Synthetic system adhesives, such as an acrylic acid and a methyl methacrylate system copolymer, an oxidized starch, The adhesives generally known, such as natural system adhesives, such as a etherification starch, an esterification starch, a cold-water soluble starch that carries out flash plate dry cleaning of an enzyme denaturation starch or them, and is obtained, casein, and soybean protein, are mentioned. Moreover, the various assistants blended with the usual pigment application liquid for coated paper, such as a thickener, a water retention agent, a deck-watertight-luminaire-ized agent, and a coloring agent, can use it suitably if needed.

[0026] As a base material used by this invention, the paper of fine quality generally used, a report grade paper, \*\*\*\*, and pigment coated paper are mentioned.

[0027]

[Function] As for this invention, 40% of the weight or more of application liquid is applied to solid-content concentration in the application layer which the domains of the basis weight of the bone dry of a base material are 20-30g/m<sup>2</sup>, and it prepared in one side or both sides on a base material using a curtain coater, and when the domains of the coverage per one side of this application layer are 6-14g/m<sup>2</sup> in a bone dry, the coated paper for lightweight printing excellent in the printability and the operation stability at the time of an application is

[0028]

[Example] Next, although an example explains this invention still in detail, this invention is not limited to this. In addition, each the section and % which are shown below are weight criteria, and the section made the total amount of a pigment the 100 sections. Moreover, a basis weight and a coverage are bone-dry values.

[0029] Coniferous-tree pulp (150ml of Canada standard freenesss) was prepared, and 60% of the thing was prepared for the hardwood pulp (350ml of Canada standard freenesss) 40% as example 1 <base-material> pulp combination. Moreover, it could be 4% as a part for Kaminaka's weight, using talc as a loading material. Using the sizing compound of a rosin system, it \*\*ed in 0.4% per weight for pulp, and added 2% per weight for pulp, using a sulfuric-acid band as a fixing agent, and the sizing compound produced 22g of basis weights/, and the base material of m<sup>2</sup>.

[0030] By the combination below a <coating>, solid-content concentration used the curtain coater for both sides of the base material which was able to obtain the application liquid which is 44%, applied the coverage per one side as 8g/m<sup>2</sup>, and produced the coated paper for lightweight printing.

- The 1st class kaolin of application liquid combination marketing (ultra white 90) The 2nd class kaolin of 40 section marketing (\*\*\*\*\* light) 30 section marketing whiting (car \*\*\*\*\* 90) 20 section marketing anatase type titanium oxide (A-110) 10 section marketing styrene butadiene latex 12 section marketing phosphorylation starch 5 section marketing polyacrylic-acid system dispersant The 0.1

sections [0031] Except having made concentration of example 2 application liquid into 56%, it is the same technique as an example 1, and the coated paper for lightweight printing was produced.

[0032] Except having set the basis weight of example 3 base material to 28g/m<sup>2</sup>, it is the same technique as an example 1, and the coated paper for lightweight printing was produced.

[0033] Except having set the coverage per one side of example 4 application liquid to 12g/m<sup>2</sup>, it is the same technique as an example 1, and the coated paper for lightweight printing was produced.

[0034] Except having made concentration of example 5 application liquid into 56%, it is the same technique as an example 4, and the coated paper for lightweight printing was produced.

[0035] Except having set the basis weight of example 6 base material to 28g/m<sup>2</sup>, it is the same technique as an example 4, and the coated paper for lightweight printing was produced.

[0036] Except having set the basis weight of example of comparison 1 base material to 18g/m<sup>2</sup>, it is the same technique as an example 1, and the coated paper for lightweight printing was produced.

[0037] Except having set the basis weight of example of comparison 2 base material to 18g/m<sup>2</sup>, it is the same technique as an example 4, and the coated paper for lightweight printing was produced.

[0038] Except having made concentration of example of comparison 3 application liquid into 37%, it is the same technique as an example 1, and the coated paper for lightweight printing was produced.

[0039] Except having made concentration of example of comparison 4 application liquid into 37%, it is the same technique as an example 4, and the coated paper for lightweight printing was produced.

[0040] Except having set the coverage per one side of example of comparison 5 application liquid to 5g/m<sup>2</sup>, it is the same technique as an example 1, and the coated paper for lightweight printing was produced.

[0041] Except having set the coverage per one side of example of comparison 6 application liquid to 17g/m<sup>2</sup>, it is the same technique as an example 1, and the coated paper for lightweight printing was produced.

[0042] As example of comparison 7 coater, except having used the blade coater, it is the same technique as an example 1, and the coated paper for lightweight printing was produced.

[0043] As example of comparison 8 coater, except having used the rod coater, it is the same technique as an example 1, and the coated paper for lightweight printing was produced.

[0044] As example of comparison 9 coater, except having used the air knife coater, it is the same technique as an example 1, and the coated paper for lightweight printing was produced.

[0045] As example of comparison 10 coater, except having used the transfer roll coater, it is the same technique as an example 1, and the coated paper for lightweight printing was produced.

[0046] All the obtained coated paper for lightweight printing evaluated by the same conditions, after giving supercalender finishing.

[0047] Evaluation of printing nonuniformity was wetted in 4 color-printing Roland offset press, was printed on condition that the excess of water, and was left at the room temperature one whole day and night, and viewing performed it about the printing section whose rate of area of the half tone dot of the monochrome of the cyanogen of a sample is 50%. (5 is most excellent in unit: 5 phase evaluation)

[0048] Measurement of glossiness was performed with the incident angle [ of 75 degrees ]-angle of reflection of 75 degrees using the Murakami formula glossmeter.

[0049] With 4 color-printing Roland offset press, evaluation of back projection of ink was printed on one side of a sample, and was left at the room temperature one whole day and night, and viewing performed it about the rear face of the solid printing section whose rate of area of the half tone dot of 4 \*\*\*\*\*s of a sample is 100%. The evaluation unit was considered as 5 phase evaluation. Although an error criterion sets to 5 what back projection is not regarded as, that by which feeble back projection is observed is set to 4 and back projection was seen, the grade which is satisfactory practically was set to 3, back projection was observed clearly, that it can be judged that interferes in a picture image on the back was set to 2, and what can be judged that back projection is remarkable and interferes in a picture image on the back remarkably was set to 1.

[0050]

[Table 1]

実施例 及び 比較例	塗布方式	基材 坪量 g/m <sup>2</sup>	塗布 量 g/m <sup>2</sup>	塗液 濃度 wt%	印刷適性			操業性
					ムラ	光沢 %	裏写	
実施例 1	カーテン	22	8	44	4	51	4	
" 2	"	22	8	56	4	53	4	
" 3	"	28	8	44	4	51	4	
" 4	"	22	12	44	5	54	5	
" 5	"	22	12	56	5	55	5	
" 6	"	28	12	44	5	53	5	
比較例 1	"	18	8	44	4	49	3	基材切断発生
" 2	"	18	12	44	4	50	3	基材切断発生
" 3	"	22	8	37	3	42	4	基材切断発生
" 4	"	22	12	37	4	44	4	基材切断発生
" 5	"	22	5	44	2	37	2	
" 6	"	22	17	44	5	58	5	印刷搬送阻
" 7	ブレード	22	8	44	2	35	3	基材切断多発
" 8	ロッド	22	8	44	2	34	3	基材切断多発
" 9	エアナイフ	22	8	44	2	36	2	基材切断発生
" 10	ロール	22	8	44	1	28	1	基材切断発生

[0051] According to the examples 1-6, the basis weight of the bone dry of a base material is made into the domain of 20-30g/m<sup>2</sup>, and a curtain coater is used [ concentration ] for 40% of the weight or more of application liquid. the coverage per one side by the bone dry as a domain of 6-14g/m<sup>2</sup> By applying, it is clear that the coated paper for lightweight printing which does not have failure, such as printing nonuniformity and back projection of ink, and was excellent in the manifestation of gloss is obtained under high operation nature.

[0052] According to the examples 1 and 2 of a comparison, when the basis weight of a base material is less than [ 20g //m ] two, the intensity of a base material becomes easy to generate a disconnection of low fault past \*\*\*\*\*, and operation nature is not stabilized. It becomes easy to generate back projection. According to the examples 3 and 4 of a comparison, since penetration of application liquid happens [ liquid concentration ] to a base material notably less than 40% of a case, the intensity of a base material falls after an application, it becomes easy to generate a disconnection of a base material, and operation nature is not stabilized. Since according to the example 5 of a comparison the covering nature of the base material of an application layer gets worse when a coverage is less than [ 8g //m ] two, printing nonuniformity and back projection occur. According to the example 6 of a comparison, if a coverage exceeds 14g/m<sup>2</sup>, as coated paper for lightweight printing, stiffness will run short and the conveyance nature at the time of printing will get worse. According to the examples 7-9 of a comparison, a disconnection of a base material occurs with penetration of the liquid which happens between the liquid supply section and a metering zone, and the shearing force at the time of measurement. According to the example 10 of a comparison, a base material sticks to a roll with the adhesion of application liquid, and a disconnection of a base material occurs at the roll outlet after an application.

[0053]

[Effect of the Invention] According to this invention, there is no failure, such as printing nonuniformity and back projection of ink, and the coated paper for lightweight printing excellent in the manifestation of gloss is obtained under high operation nature.

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